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Self-Sealing Couplings for Use in Pressure Fluid Systems

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15 Claims

The present invention relates in general to self-sealing couplings for use in pressure fluid systems. More specifically, the invention relates to co-axial self-sealing couplings for use in connecting a source of high pressure fluid to a device which uses a pressure differential, the coupling providing both high pressure flow and low pressure return-flow paths. The expression "fluid" is intended to mean both liquids and gases.

The principal object of the invention is to provide a coupling in which both the fluid flow path and the fluid return-flow path are made or broken simultaneously when the two parts of the coupling are connected or disconnected.

According to the present invention, the coupling comprises a female assembly and a male or mating assembly which is adapted to be detachably engaged in the female assembly, the two assemblies comprising hollow members providing pressure fluid flow paths which cooperate to form a unitary pressure fluid flow path through the coupling when the two assemblies are operatively engaged, valve or sealing means in each assembly which acts to prevent the flow of pressure fluid through the flow path in the assembly when the two assemblies are separated, a fluid return-flow path associated with each assembly, the two return-flow paths being arranged to communicate when the two assemblies are engaged, and sealing means for sealing the two return-flow paths when the two assemblies are separated, the arrangement being such that by the act of mechanically coupling the two assemblies the flow of fluid pressure and the fluid return-flow can take place simultaneously respectively through the two flow paths and the return flow paths in the two assmblies, which paths are then sealed against leakage of fluid from between them, whereas when the two assemblies are separated the pressure fluid flow paths and the return flow paths in the two assemblies are sealed automatically and simultaneously to prevent egress of fluid from each assembly.

Means are preferably provided for ensuring that the force required for holding the two assemblies connected is much less than the separating force due to the pressure of the fluid in the coupling.

Although not essential, it is preferred that the pressure fluid flow path and the return-flow path are coaxial in each assembly, so as to ensure that the paths shall be simultaneously sealed or unsealed by the removal from or the engagement of the male assembly in the female assembly.

In one constructional form of the invention, which will be fully described hereinafter, the pressure fluid flow path in the female assembly is formed in a hollow flow tube arranged in the body part of the assembly, and wherein the said valve or sealing means in this assembly comprises a spring-urged hollow piston which is slidable in the flow tube and in a thrust head connected to the latter and is formed with at least one port which, or each of which, when the two assemblies are separated, communicates with an annular chamber arranged between the piston and the thrust head, leakage of fluid from the flow tube and the said chamber being prevented by sealing devices arranged in the thrust tube at the opposite ends of the chamber. The return flow of the fluid through the female assembly takes place axially through a return-flow path around the flow tube and the thrust head.

The means for closing the return-flow path through the female assembly of the coupling when the two assemblies are separated may consist of a hollow, spring-urged obturaring member which surrounds the thrust head and is slidable in the body part of the assembly and which, when the two assemblies are separated, is spring-urged into contact with an annular sealing member carried by the thrust tube at the end of the latter adjacent to the entry end of the female assembly.

In the same construction the fluid flow path in the male assembly is formed in a hollow thrust head which is fixed in the body part of the male assembly, and the return flow of the fluid takes place in the body part around the thrust head. The means for sealing the return flow path in the male assembly when the two assemblies are separated comprises a spring-urged sealing member having a body part which is arranged upon, and at the mating end of, the thrust head and which, when the two assemblies are separated, acts to cover one or more ports formed in the thrust head. Leakage of the pressure fluid from the thrust head when the two assemblies are separated is prevented by sealing devices arranged in the body part of the sealing member at the opposite sides of the said port or ports. The sealing member carries a sealing ring which, when the two assemblies are separated, co-acts with a seating formed in the body part of the male assembly near the front end thereof and prevents the flow of fluid through the return flow path in the assembly.

The above-mentioned means for ensuring that the force required for holding the two assemblies connected shall be much less than the separating force due to the pressure of the fluid in the coupling may consist of a number of spring-pressed plungers which are carried at the entry end of the body part of the female assembly and which when the two assemblies are fully engaged, by cooperation with an abutment on the body of the female assembly, are adapted to cooperate with stops formed externally on the body of the male assembly.

When the body part of the male assembly is engaged in the body part of the female assembly, leakage of fluid between the two body parts may be prevented by means of at least one sealing ring which is arranged in an annular recess formed in the mating end of the body of the male assembly and cooperates with the bore of the body of the female assembly. The mating end of the body of the male assembly is formed with a conical face which cooperates with a conical face on the adjacent end of the obturating member, the arrangement being such that as the body part of the male assembly is engaged in the body part of the female assembly the two sloping faces engage and the obturating member is pushed back against the pressure of its spring and its tip is disengaged from the sealing ring on the thrust head of the female assembly, and thus the return-flow paths in the two assemblies are put into communication. The sealing ring on the said sealing member which is slidable on the fixed thrust head in the male assembly is puched back from its seating

and, due to the engagement of the mating faces of the thrust tube in the male assembly and the hollow piston in the female assembly, the piston is also pushed back so that fluid may flow from the flow tube in the female assembly through the ports in the piston into the said annular chamber surrounding the piston and into the thrust head in the male assembly through the ports formed in that thrust head.

In the construction briefly described above the return flow of the fluid into and out of the coupling takes place through conduits arranged at an angle to the flow paths in the two assemblies. In a modified construction, however, the return-flow conduits in each assembly is arranged coaxially with the flow path.

Further constructional features of the invention will be described hereinafter.

Constructional forms of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein:-

Figure 1 is a longitudinal section of the female assembly of one self-sealing coupling;

Figure 2 is a longitudinal section of the male assembly of the same coupling;

Figure 3 shows in longitudinal section, above the longitudinal axis, the two assemblies when partly engaged and, below the axis, the two assemblies when fully engaged, the Figure also showing slight modifications of the constructions shown in Figs. 1 and 2;

Figure 4 is a fragmentary longitudinal section of a modified male assembly; and

Figure 5 is a fragmentary longitudinal section of a modified female assembly for use with the male assembly shown in Fig. 4.

Referring first to Figs. 1 and 2:—

In this constructional form of the invention the coupling comprises a female part (Fig. 1) including a hollow cylindrical body 1 which is threaded internally at its front end to receive an end cap 2, an O or toroidal sealing ring 3 being arranged in an annular groove formed in the end cap at the rear of the threads and encircling the rear non-threaded adjacent end of the hollow body 1, the purpose of the ring being to prevent leakage of fluid between the overlapping parts of the body and the end cap. At its front end, the body is formed with three equi-distantly spaced hollow radial lugs 4, each of which is bored to receive a plunger 5 comprising a rod 5A which is slidably arranged in a hole in a partition 6 in the lug and is formed with a head 7 which normally projects out of the outer end of the bore of the lug and which is acted upon by a spring 8 arranged between the outer face of the partition in the lug and the inner face of the head. On the opposite side of the partition the plunger rod 5A is provided with a catch 9, the inner face of which is of coned section for a purpose which will be referred to hereinafter.

The body 1 is slidably mounted in a hole 10 formed in the base 11 of a cup-shaped hollow spring-retaining member 12 so that the body can move axially in relation to the member when sufficient force is applied to the body to compress a helical compression spring 13 which acts between the inner surface of the base 11 of the spring-retaining member and a ring 14 which is fitted around the body and is located against an external shoulder 15 thereon. The spring retaining member 12 is shaped near its front end to form three radial lugs 16, each of which is formed at its front end surrounding the front end of the hollow body with a sloping face or inclined plane 17, the sloping faces being so positioned and inclined that the above mentioned spring-loaded plungers 5 carried in the lugs 4 on the front end of the body are forced inwardly as the body is moved inwards in relation to the spring-retaining member.

On the rear face of each of the three lugs 4 on the body there is a projecting guide pin 18 which engages in a hole 19 formed in one of the lugs 16 on the spring-retaining member.

One end of a flow tube 20 is slidably arranged in a hole 21 formed in the base 2A of the end cap and within the bore of the flow tube there is a coil spring 22, one end of which bears on the inner end of a hollow piston member 23 which is slidable in the bore, while the other end of the spring bears against an inlet union 24 screwed into the rear end of the flow tube 20 which projects out of the base 2A of the end cap. An annular bonded sealing member 25 is arranged between the union and the external face of the flow tube. Leakage of fluid to the exterior between that part of the flow tube which is slidable in the hole 21 in the base of the end cap is prevented by an O or toroidal sealing ring 26, which is arranged in an annular groove formed in the said part of the flow tube. The front end 27 of the piston member is closed and at the rear of the closed end the member is formed with a number of ports 28. At its rear end the piston 23 is slidable in the bore of the flow tube and leakage of fluid from between the piston member and the flow tube is prevented by an O or toroidal sealing ring 29 fitted in a groove formed in a flange at the rear end of the piston.

The flow tube 20 is located centrally in the bore of the body by means of radial fin members 30 registering in a stepped diameter 31 formed in the interior of the rear end of the body, the spaces between the fins forming a fluid flow path. The front end of the flow tube is threaded to receive a cylindrical thrust head 32 which is so shaped internally over part of its length that a chamber 33 is formed between the inner surace of the thrust head and the piston member 23 so as to provide a flow path for the fluid through the ports 28 in the piston member as described hereinafter. The piston member is slidable in a hole 34 formed centrally in, and at the enlarged or flanged front end 35 of the thrust head. Leakage of fluid from between the thrust head 32 and the piston member 23 is prevented by two O or toroidal sealing rings 37 which are fitted in spaced annular grooves formed in the thrust head near its front end and the part of the thrust head which forms the rear end of the said chamber 33 in the thrust head.

The outer surface of the thrust head is threaded to receive a clamping ring 38 between which and the flanged front end 35 of the thrust head, a sealing member 36, having a coned rear face 36A and made of a suitable soft and somewhat elastic material is clampte. The soft material selected will depend upon the nature of the fluid flowing through the coupling.

A cup-shaped hollow obturating member 39 is arranged in the bore of the body and is formed between its ends with an enlarged external part of flange 39A which is slidably arranged in the body, leakage of fluid between the enlarged part or flange and the body being prevented by an O or toroidal sealing ring 40 arranged in an annular groove in the enlarged part or flange. The front end or base of the obturating member 39 is formed with a coned tip 41 and the base fits around the above mentioned sealing member 36 of soft material and the clamping ring 38 on the thrust head. The obturating member is slidable over the clamping ring. The tip of the cone 41 is thrust against the coned rear face of the sealing washer 36 of soft material by means of a coil spring 42 the rear end of which bears against the said radial fins 30 provided on the flow tube and the inner face of the base or end wall of the obturating member 39.

Referring to Fig. 2:—

The male part of the coupling comprises a body 42 which is threaded at its rear end to receive a hollow

end cap 43, leakage of fluid from the body to the exterior of the end cap being prevented by an O or toroidal sealing ring 44 which is arranged in an annular groove formed in the inner wall of the front end of the end cap which overlaps the rear end of the body. The front or entering end of the body is formed with an external coned surface 45 which ensures the easy entry of the body into the front end or mouth of the female part of the coupling, see Fig. 1, the mouth also being formed internally, and at the rear of the said ribs 4 wherein the spring-urged plungers 5 are mounted, with a coned part 46 corresponding to the external coned front end 45 of the body of the male part. The front end of the bore of the body of the male part is formed with a conical face 47, the shape of which corresponds to the shape of the coned front end 41 of the above mentioned obturating member 39, leakage of fluid from between the overlapping parts of the coupling when the two parts are engaged being prevented by an O or toroidal sealing ring 48 which is arranged in an annular recess formed in the body 42 of the male part of the coupling at the rear of the external coned surface 45 at the front or entering end of the latter. At a distance from the front or entering end of the body of the male part the external surface of the body is formed with an annular ridge 49 of angular section, the rear edge 50 of the ridge being arranged at a steeper angle than the front edge 50A. Thus, as the male part is inserted into the female part of the coupling to a sufficient depth, the above mentioned catches 9 of the spring-loaded plungers 4 at the entry and or mouth of the female part of the coupling bear upon the face of the ridge 50 of steeper slope so as to prevent the withdrawal of the male part from the female part of the coupling, while sufficient force is exerted on the coil spring 13 which acts upon the slidable body 1 of the female part of the coupling due to the relative displacement of the body and the spring-retaining member 12. The force needed to depress the coil spring 13 is small compared to the force which would need to be exerted to hold the coupling together against internal pressure, owing to the fact that the spring-urged catches 9 are preventing the internal pressure from disengaging the two parts of the coupling.

A central thrust tube 51 is arranged in a hole 52 in the base 43A of the end cap 43 of the male part and within the body 1 and the end cap the tube is formed externally with radial lugs 53 which fit closely into a step 54 in the interior of the body so that the thrust tube 51 is located centrally in the body. The fins and the step are so constructed that the return flow of fluid can take place through them. The rear end of the thrust tube extends outwards through the hole 52 in the base 43A of the end cap and leakage of fluid from the body between the thrust tube and that part of the end cap which fits around the thrust tube is prevented by means of an O or toroidal sealing ring 54 which is fitted in an annular groove formed in the base of the end cap around the hole 52 in the latter.

A helical coil spring 55 is arranged around the central thrust tube 51 and bears at its rear end on a shoulder 56 on the thrust tube and at its front end against the body of a sealing member 57 which is slidably arranged at the front end of the tube over ports 58 which are formed in the tube at the rear of the closed front end of the latter. Leakage of fluid from the interior of the tube between the outer surface of the latter and the body of the sealing member 57 is prevented by longitudinally-spaced O or toroidal sealing rings 59 fitted in annular grooves formed in the body. At its front end, the body of the sealing member 57 carries an annular sealing device 60 which is made of a suitable softer and somewhat elastic material and is located between a shoulder 61 on the body and an annular conical ridge 62 formed on the adjacent end of a retaining ring 63 which is screwed on the body of the slidable member. At its front end the annular sealing device 60 is provided with a conical face 64 which bears on a narrow inclined shoulder 65 formed near the front or entry end of the bore of the body 42 of the male part of the coupling.

The entering edge or tip 66 of the annular sealing sevice 64 is shaped to a semi-circle of small radius which projects slightly above the mating face 67 of the central thrust tube in the male part of the coupling, so that when the mating faces 67 and 27 (Fig. 1) of the two parts of the coupling engage, a seal is provided to prevent fluid flow from the flow path to the return path as the coupling is engaged, the tip 66 then engaging in a circular recess 68 in the mating face 27.

In describing the method of coupling of the two parts of the coupling reference will be made to Fig. 3, which as mentioned shows the coupling shown in Figs. 1 and 2 but incorporates certain modifications which will be referred to hereinafter.

When the two parts of the coupling are separated, the fluid paths through the two parts are sealed in the following manner:—

Referring to Fig. 1,

The spring 22 which acts upon the hollow piston 23 which is slidable in the female part of the coupling forces the flange 30 at the rear of the piston against a stop 69 which is formed by the rear end of the cylindrical thrust head 32. The ports 28 in the piston 23 communicate only with the chamber 33 formed between the piston and the thrust head 32, the exit of fluid from which chamber is obstructed by the O or toroidal sealing rings 36 and 37 arranged in the annular grooves in the thrust head.

The coil spring 42 which acts between the ribs 30 on the central tube 20 and the obturating member 39 forces the tip of the coned front end 41 of the obturating member 39 against the soft material carried by the thrust head 32, which latter is held against the stepped feature 31 in the interior of the body 1 when the end cap 2 is screwed into position.

Referring to Fig. 2,

The spring 55 in the male part of the coupling forces the body 57 of the sealing member 63 and the sealing device 64 of soft material along the thrust head longitudinally in the bore of the body 42, thus forcing the sealing device on to its cooperating shoulder 65 in the body and preventing leakage of fluid from the interior of the male part of the coupling. At the same time, the body 57 is so positioned that the ports 58 formed in the wall of the thrust tube 51 are disposed between the two sealing rings 59 arranged in the body 57.

Referring also to Fig. 3:—

When the male part of the coupling is inserted into the female part it enters the body 1 of the latter freely until the sealing ring 48 which is fitted in the groove at the front end of the body part 42 of the male part of the coupling, at the rear of the entering edge of the latter, bears on the wall of the bore of the body 1 of the female part of the coupling. As the axial movement of the male part of the coupling is continued the coned front end 45 of the bore of the body of the male part engages with the conical front face 41 of the sliding obturating member 39 in the female part of the coupling and further compresses the spring 42 acting on the obturating member, thus separating the coned front end of the obturating member 39 from the sloping or sealing face 36A of the sealing ring 36 of soft material fitted at the front end of the thrust head 19 of the female part. The front end of the thrust head 19 in the female part of the coupling bears on the tip of the sealing device 64 forming part of the sliding sealing member 57, 63, 64 on the thrust tube 51 of the male part of the

coupling and pushes the sealing member along the thrust tube, so that the ports 58 in the thrust tube pass beyond the front sealing ring 59 which, as mentioned above, is fitted between the body 57 of the sealing member and the thrust tube 51, when the latter has pushed back the spring-loaded piston 23 in the female part of the coupling.

When the engaging movement has been continued sufficiently, the ports 58 in the thrust tube 51 of the male part of the coupling and the ports 28 in the slidable piston 23 of the female part of the coupling both communicate with the chamber 33 in the thrust head of the female part of the coupling, thus providing a free flow path for the pressure fluid from the union 24 on the flow tube 20 of the female part, through the flow tube and into the thrust head 51 of the male part. As the engaging movement is continued still further, the rear face of the flange 39A on the obturating member 39 abuts against a shoulder 1A in the bore of the body of the female part of the coupling, thus transferring the thrust directly to the body, so that the latter in turn is displaced relatively to the spring retaining member 12, allowing the spring-loaded latches 9 to be driven inwards to lock the two parts of the coupling together by their engagement behind the sloping face 50 of the annular ridge 49.

As the sliding sealing member 57, 63, 64 on the thrust tube 51 of the male part of the coupling is thrust by its spring 55 against the head 35 of the thrust tube 32 in the female part of the coupling, the rounded lip 66 of the sealing device 64 forming part of the sealing member 64 is pressed into an annular groove 68 in the thrust head of the female part thus sealing off the two fluid paths, i.e., the flow paths for the pressure fluid and the return path referred to hereinafter, from one another.

In the coupling described above, the flow of fluid takes place in a closed circuit from a source of pressure fluid, such as a pump (not shown) through the union 24 attached to the rear end of the flow tube 20 in the female part of the coupling, through the hollow piston 23 and out of the ports 28 at the front end of the piston into the chamber 33 formed in the thrust head 32 around the piston. The fluid then flows through the ports 58 in the thrust tube 51 of the male part of the coupling into the interior of the thrust tube and out of the rear end of the latter into a device (not shown) utilising a pressure drop, e.g., a turbine or motor.

Return of fluid in the case of the male part of the coupling takes place through a duct 70 which is formed in the end cap 43 at the front of the rear wall of the base of the cap. In the case of the female part of the coupling, return flow of the fluid takes place from the interior of the end cap 2 through a return duct 71 which is arranged at the front of the base 2A of end cap and thence back to the said source of pressure fluid.

As mentioned above, the construction of the coupling shown in Figure 3 is somewhat modified. The O sealing rings 44A are arranged in annular recesses formed in the body 42 of the male part of the coupling and the O sealing rings 26A are arranged in annular recesses formed in the end cap 2 of the female part of the coupling, reverse arrangements being used in the coupling parts shown in Figs. 1 and 2.

In the modified male part of the coupling shown in Fig. 4, the annular O-sealing rings 59A are arranged in annular recesses formed in the thrust tube 51 on opposite sides of the ports 58. This arrangement is advantageous over that shown in Fig. 2, in which the front sealing ring 59 has to pass over the ports 58, which tends to cut the sealing ring, particularly as the direction of flow of the fluid when the two parts of the coupling are engaged tends to force the sealing ring into the port.

The face of the front end of the thrust tube 51 is formed with an annular recess 80 and the annular recess in which the front ring 59A is arranged is connected to the recess 80 by drain holes 81. Further, the tip 66 on the sealing device 64 is removed as it is no longer necessary in this modified construction.

Referring to Fig. 5, the O-sealing ring 36 is removed from the hollow piston 23 (compare Fig. 1) and an O-sealing ring 36A is arranged in an annular recess formed in the head of the hollow piston. The head is formed with a recess 82 and the annular recess is connected to the face of the head by drain holes 83.

When the two parts of the coupling are engaged, the recess 80 in the thrust tube 51 of the male member faces the recess 82 in the hollow piston 23 of the female members. Some of the low pressure fluid flowing through the return path of the coupling passes through the drain holes 81 and 83 and exerts pressure on the rings 59A and 39A and thus prevents the front O-sealing ring 59A in the thrust tube 51A and the sealing ring 36A in the hollow piston 32 being forced out of their recesses by the action of the high pressure fluid when the ports 58 and 28 are open to the chamber 33.

In a further modification, the return flow of the fluid from the body 42 of the male part of the coupling takes place axially around the thrust tube 51A and through an outer tube which is fitted in the rear end of the body and surrounds the thrust head. In the case of the female part of the coupling the return flow of the fluid takes place axially through an outer tube which is fitted in the rear end of the body and surrounds the flow tube 20. In this construction the return flow dects 70 and 71 are of course eliminated.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A self-sealing coupling for use in pressure fluid system, which comprises a female assembly and a male assembly which is adapted to be detachably engaged in the female assembly by axial movement relatively to the female assembly, the two assemblies comprising hollow members providing pressure fluid flow paths which cooperate to form a unitary pressure fluid flow path through the coupling when the two assemblies are operatively engaged, valve means in each assembly which acts to prevent the flow of pressure fluid through the flow path in the assembly when the two assemblies are separated, a fluid return-flow path for the return of fluid which has passed through the pressure fluid paths associated with each assembly, the two return-flow paths being arranged to communicate when the two assemblies are operatively engaged, the pressure fluid flow path and the return-flow path being coaxial in each assembly, so as to ensure that the paths shall be simultaneously sealed or unsealed by the removal from or the engagement of the male assembly in the female assembly, the arrangement being such that by the act of mechanically coupling the two assemblies the flow of fluid pressure and the fluid return-flow can take place simultaneously respectively through the two flow paths and the return flow paths in the two assemblies, which paths are then sealed against leakage of fluid from between them, whereas when the two assemblies are separated the pressure fluid flow paths and the return flow paths in the two assemblies are sealed automatically and simultaneously to prevent egress of fluid from each assembly.

2. A coupling as claimed in Claim 1, wherein the pressure fluid flow path in the female assembly is formed in a hollow tube arranged in the body part of the assembly, and wherein the said valve means in this assembly comprises a spring-urged hollow piston which is slidable in the flow tube and in a thrust

head connected to the latter and is formed with at least one port which, when the two assemblies are separated, communicate with an annular chamber arranged between the piston and the thrust head, leakage of fluid from the flow tube and the said chamber being prevented by sealing devices arranged in the thrust tube at the opposite ends of the chamber.

3. A coupling as claimed in Claim 2, wherein the return flow of the fluid through the female assembly takes place axially through a return-flow path around the flow tube and the thrust head.

4. A coupling as claimed in Claim 2 or 3, wherein the means for closing the return-flow path through the female assembly of the coupling when the two assemblies are separated consists of a hollow, spring-urged obturating member which surrounds the thrust head and is slidable in the body part of the assembly and which, when the two assemblies are separated, is spring-urged into contact with an annular sealing member carried by the thrust tube at the end of the latter adjacent to the entry of the female assembly.

5. A coupling as claimed in Claim 2 or 3 wherein the flow tube is supported in a hole formed in an end cap closing the rear end of the body part of the assembly, and wherein leakage of fluid between the flow tube and the hole is prevented by a sealing device.

6. A coupling as claimed in claim 2, wherein the pressure fluid flow path in the male assembly is formed in a hollow thrust head which is fixed in the body part of the male assembly, and the return flow of the fluid takes place in the body part around the thrust head.

7. A coupling as claimed in Claim 6, wherein the means for sealing the return flow path in the male assembly when the two assemblies are separated comprises a spring-urged sealing member having a body part which is arranged upon, and at the mating end of, the thrust head and which, when the two assemblies are separated, acts to cover ports formed in the thrust head.

8. A coupling as claimed in Claim 7, wherein leakage of the pressure fluid from the thrust head when the two assemblies are separated is prevented by sealing devices arranged in the body part of the sealing member at the opposite sides of the said ports.

9. A coupling as claimed in Claim 7, wherein the sealing member carries a sealing ring which, when the two assemblies are separated, co-acts with a seating formed in the body part of the male assembly near the front end thereof and prevents the flow of fluid through the return flow path in the assembly.

10. A coupling as claimed in claim 2, comprising means for ensuring that the force required for holding the two assemblies connected shall be much less than the separating force due to the pressure of the fluid in the coupling, the said means consisting of a number of spring-pressed plungers which are carried at the entry end of the body part of the female assembly and which, when the two assemblies are fully engaged, by cooperation with an abutment on the body of the female assembly, are adapted to cooperate with stops formed extenerally on the body of the male assembly.

11. A coupling as claimed in Claim 10, wherein the said plungers cooperate with a conical inner surface of a spring-retaining member in which the body of the female assembly is slidable and which encloses a spring re-acting between the spring-retaining member and the body.

12. A coupling as claimed in Claim 2, 3 or 6, wherein when the body part of the male assembly is engaged in the body part of the female assembly, leakage of fluid between the two body parts is prevented by means of at least one sealing ring which is arranged in an annular recess formed in the mating end of the body of the male assembly and cooperates with the bore of the body of the female assembly.

13. A coupling as claimed in Claims 2, 3 or 6, wherein the mating end of the body of the male assembly is formed with a conical face which cooperates with a conical face on the adjacent end of the obturating member, the arrangement being such that as the body part of the male assembly is engaged in the body part of the female assembly the two sloping faces engage and the obturating member is pushed back against the pressure of its spring and its tip is disengaged from the sealing ring on the thrust head of the female assembly, and thus the return-flow paths in the two assemblies are put into communication.

14. A coupling as claimed in Claims 2, 3 or 6, wherein when the two assemblies are engaged the sealing ring on the said sealing member which is slidable on the fixed thrust head in the male assembly is pushed back from its seating and, due to the engagement of the mating faces of the thrust tube in the male assembly and the hollow piston in the female assembly, the piston is also pushed back so that fluid may flow from the flow tube in the female assembly through the ports in the piston into the said annular chamber surrounding the piston and into the thrust head in the male assembly through the ports formed in that thrust head.

15. A modification of the coupling claimed in Claims 2, 3 or 6, wherein leakage of pressure fluid between the mating end of the hollow piston in the female assembly and the mating end of the thrust tube in the male assembly is prevented by a flexible sealing ring which is arranged in an annular groove formed in the piston in front of the said annular chamber in the thrust head of the female assembly, and wherein leakage of pressure fluid from between the thrust tube of the male assembly and the said sealing member slidable thereon is prevented by a flexible sealing ring arranged in an annular recess formed in the thrust tube in front of the ports therein, the said annular recesses being put into communication respectively with the mating faces of the said piston and the thrust tube in the male assembly by drain holes which connect the recesses to the fluid flow return paths when the two assemblies are engaged.

ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1961

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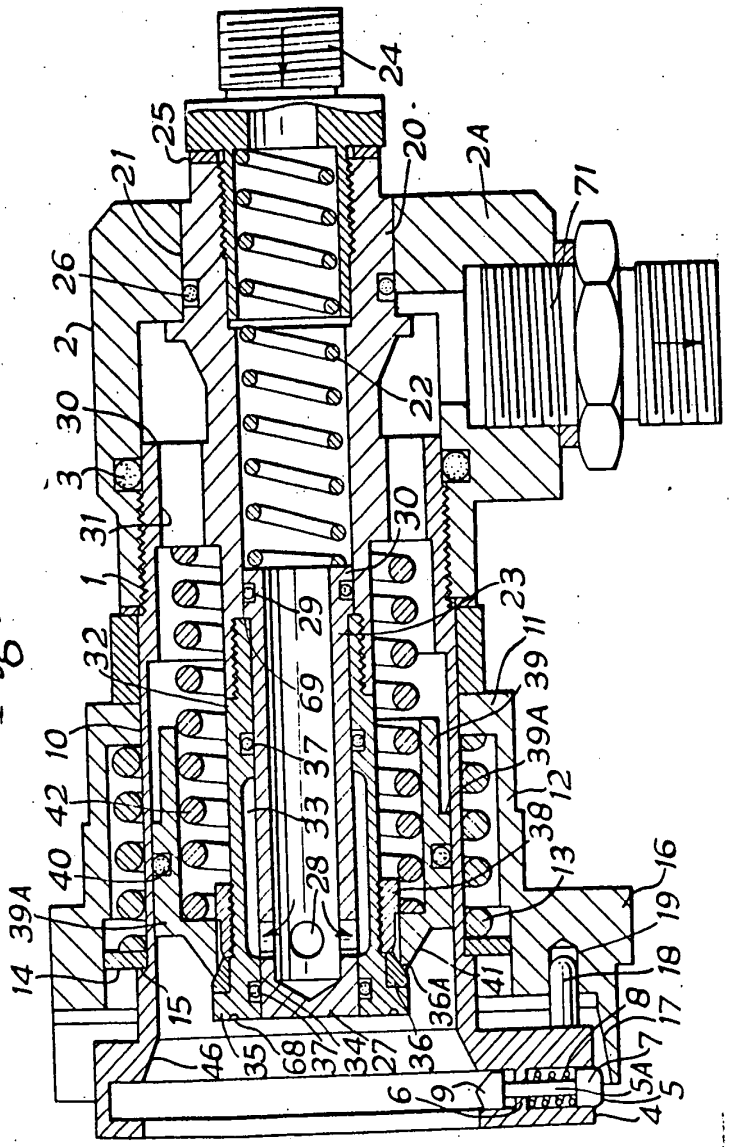

Fig. 1.

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Fig.2.

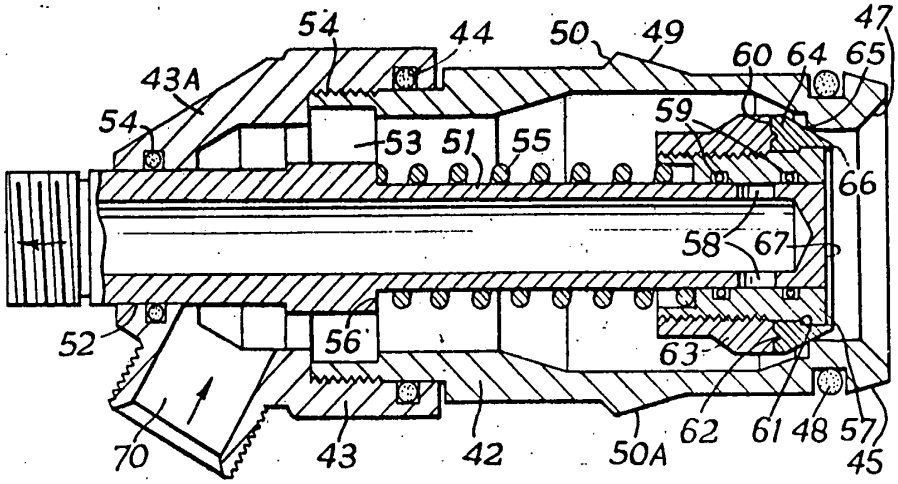
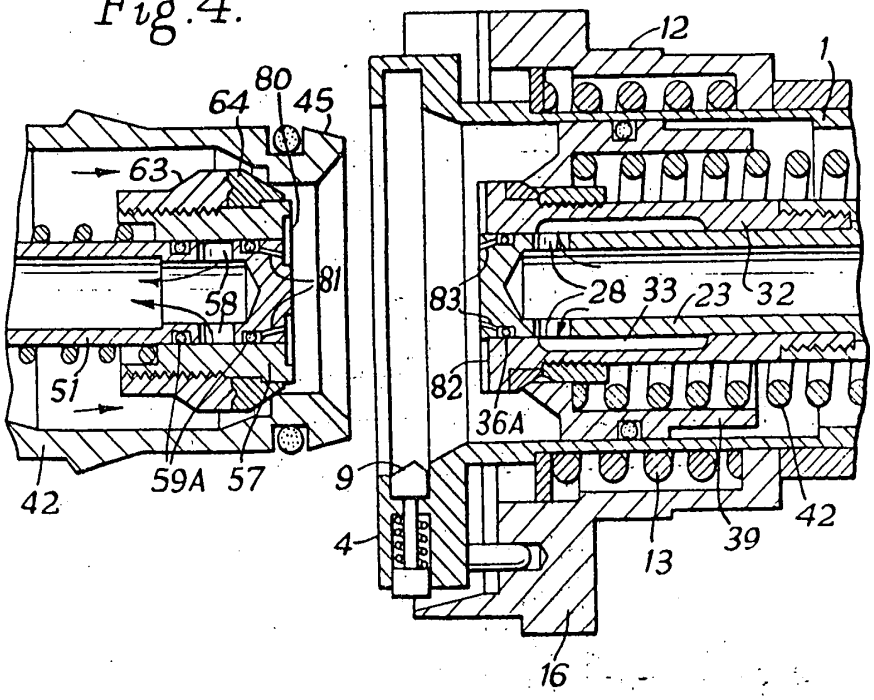


Fig.5.

Fig.4.



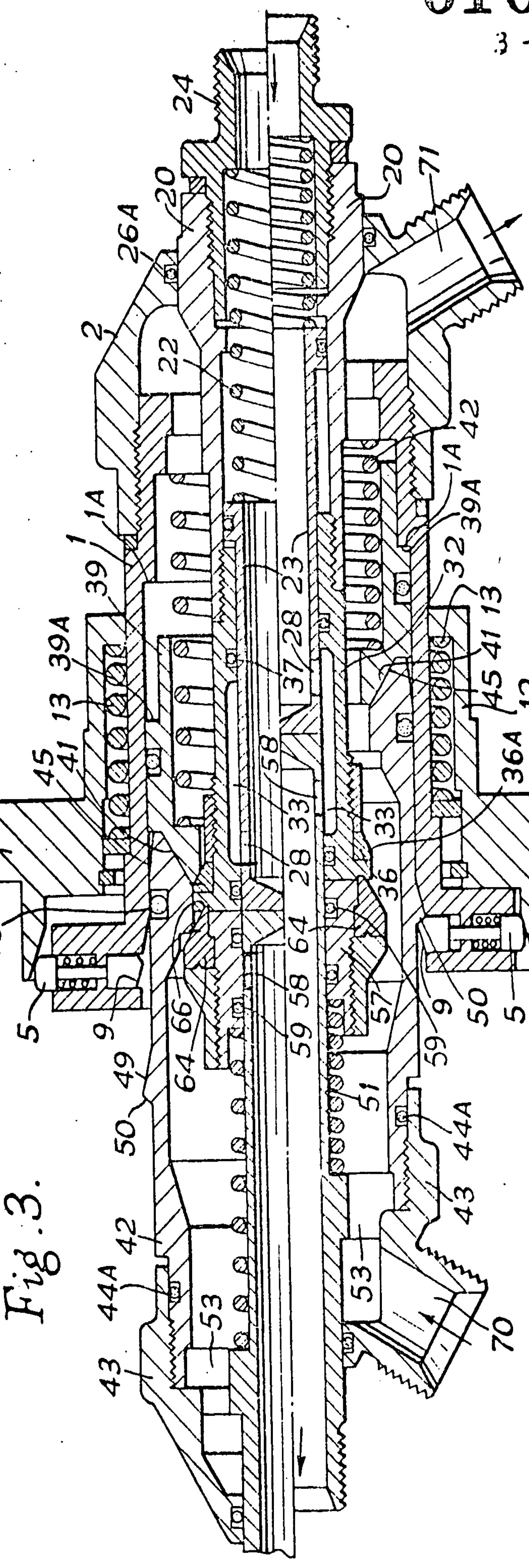

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Fig. 3.